JPL

AGU FALL '01 KAMB SPECIAL SESSION

ICE BOREHOLE VIDEO OF BASAL DOMAIN OF ICE STREAM C IN THE 2000-2001 FIELD SEASON

FRANK CARSEY
ALBERTO BEHAR
A. LONNE LANE

JET PROPULSION LABORATORY,
CALIFORNIA INSTITUTE OF TECHNOLOGY
AND

HERMANN ENGELHARDT
GEOLOGY AND GEOPHYSICS,
CALIFORNIA INSTITUTE OF TECHNOLOGY
PASADENA CALIFORNIA

Objectives

The objectives of the Borehole Camera deployment were to:

- Develop an understanding of Icestream C subglacial accretion of ice and debris with emphasis on differences between sticky spots and the (slowly) streaming ice.
- Directly observe ice-bed interactions in Icestream C including the nature of water flow and ice-rock relative motion.
- Visually examine other ice sheet properties in-situ.

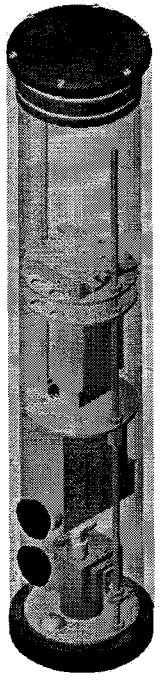
Design Considerations

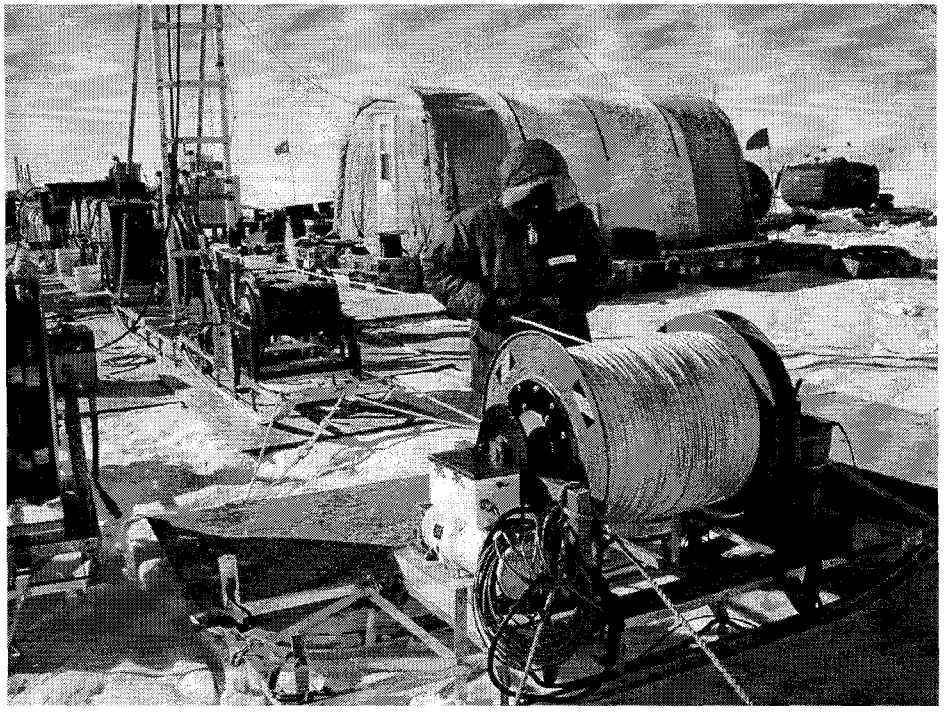
- Depth: The 1000 - 1200 m deep borehole.
- Duration: A 17 cm diameter borehole allows 4 hours camera time.
- Probe size: 12 cm diameter, 64 cm long.
- Cable: 9.5 mm X 1600 m fiber optical cable with four glass fibers, two 18 AWG electrical conductors, an Aramid strength member, a water barrier, and an outer jacket.
- Reel: Two compartment drum powered by a 3-phase 208 Volt AC motor.
- Bandwidth to surface: >1Mbit/s for adequate real time information.
- Sensors: Down and side looking cameras, with light sources; stereo images required to resolve depth.
- Data Storage: Digital Video
- Live Real-Time: Surface station video display

JPL

AGU FALL '01 KAMB SPECIAL SESSION

Ice Camera Probe
Caltech-JPL West Antarctic Basal Ice Study





F Carsey, 2001

JPL

AGU FALL '01 KAMB SPECIAL SESSION

Antarctic Borehole Photography

Up in Figure is Down in Ice; Scale is About 3X5 cm

F Carsey, 2001

JPL

AGU FALL '01 KAMB SPECIAL SESSION

Antarctic Borehole Photography

Up in Figure is Down in Ice; Scale is About 3X5 cm

F Carsey, 2001

JPL

AGU FALL '01 KAMB SPECIAL SESSION

Roof Of Miniature Subglacial Lake Under Ice Stream C

Up in Figure is Down in Ice; Scale is About 3X5 cm

F Carsey, 2001

JPL

AGU FALL '01 KAMB SPECIAL SESSION

TENTATIVE CONCLUSIONS

1. These images confirm that Ice Stream C froze to its bed and suggest it may now be in thaw.
2. Images suggest that the freezing occurred over an active subglacial aquifer.
3. Variation in inferred basal freeze-on rate consistent with rapid thermal processes of surge.
4. Sticky spots in Ice Stream C are complex in behavior.
5. Deep subsurface images are useful in study of basal processes.